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**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Application Number: 10/607,967
Filing Date: June 27, 2003
Appellant(s): RADICH, WILLIAM M.

Alan G. Rego
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed November 11, 2006 appealing from the Office action mailed April 17, 2006.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

Appellant's brief presents arguments relating to objections made to Figures 1 and 2-1. This issue relates to petitionable subject matter under 37 CFR 1.181 and not to appealable subject matter. See MPEP § 1002 and § 1201. Hence, these issues will not be considered.

Grounds of rejection with respect to prior art is correct as stated in the brief.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

6,438,180	Kavcic et al.	8-2002

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

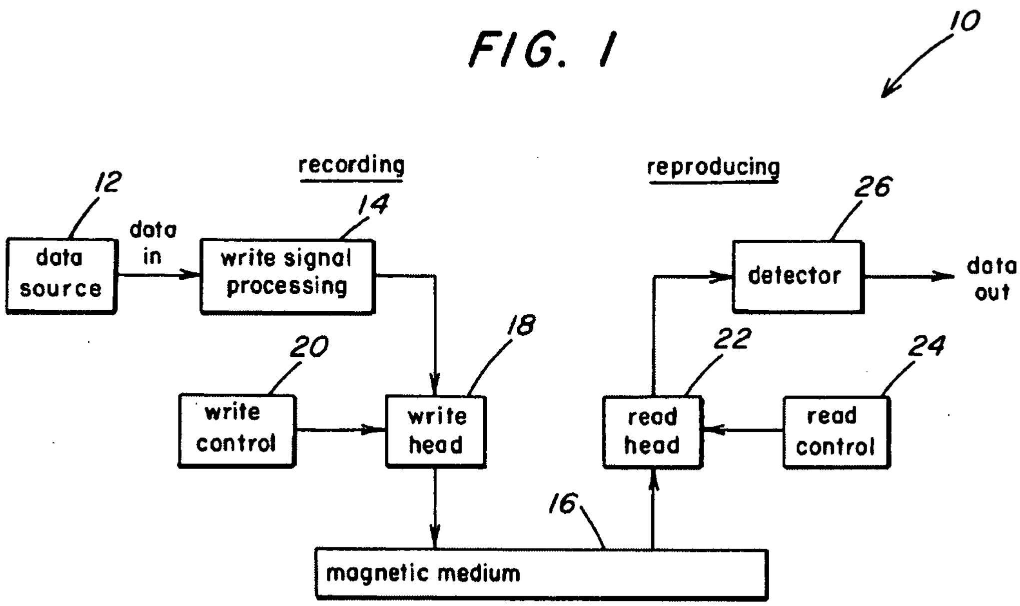
> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 2, 7, 8, 11, 12, 17, 18 and 20 are rejected under 35 U.S.C. 102(b) as being anticipated by Kavcic et al. (USPN 6438180).

As per claim 1, Kavcic et al. (herein after referred to as one entity: Kavcic) teaches (abstract and Figure 1) a method of determining branch metric values in a detector. The method includes receiving a plurality of time variant signal samples, the signal samples having one of

signal-dependent noise, correlated noise, and both signal dependent and correlated noise associated therewith. The method also includes selecting a branch metric function at a certain time index and applying the selected function to the signal samples to determine the metric values.

FIG. 1



As per claim 2, Kavcic teaches, in view of above rejections, receiving a plurality of time variant signal samples, the signal samples having one of signal-dependent noise, correlated noise, and both signal dependent and correlated noise associated therewith. The noise is caused by coloring by front-end equalizers, media noise, media nonlinearities, and magnetoresistive (MR) head nonlinearities. This noise coloring causes significant performance degradation at high recording densities. Thus, there is a need for an adaptive correlation-sensitive maximum likelihood sequence detector which derives the maximum likelihood sequence detector (MLSD) without making the usual simplifying assumption that the noise samples are independent random variables.

As per claims 7 and 8, Kavcic teaches (col. 15) the generalization of the BCJR algorithm can be made for any other soft output or hard output algorithm defined on a trellis or a graph of any communications (or other dynamic) system.

As per claim 11, Kavcic teaches (abstract) a method of determining branch metric values in a detector. The method includes receiving a plurality of time variant signal samples, the signal samples having one of signal-dependent noise, correlated noise, and both signal dependent and correlated noise associated therewith. The method also includes selecting a branch metric function at a certain time index and applying the selected function to the signal samples to determine the metric values.

As per claim 12, Kavcic teaches, in view of above rejections, receiving a plurality of time variant signal samples, the signal samples having one of signal-dependent noise, correlated noise, and both signal dependent and correlated noise associated therewith. The noise is caused by coloring by front-end equalizers, media noise, media nonlinearities, and magnetoresistive (MR) head nonlinearities. This noise coloring causes significant performance degradation at high recording densities. Thus, there is a need for an adaptive correlation-sensitive maximum likelihood sequence detector which derives the maximum likelihood sequence detector (MLSD) without making the usual simplifying assumption that the noise samples are independent random variables.

As per claims 17 and 18, Kavcic teaches (col. 15) the generalization of the BCJR algorithm can be made for any other soft output or hard output algorithm defined on a trellis or a graph of any communications (or other dynamic) system.

As per claim 20, Kavcic teaches (abstract) a method of determining branch metric values in a detector. The method includes receiving a plurality of time variant signal samples, the signal samples having one of signal-dependent noise, correlated noise, and both signal dependent and correlated noise associated therewith. The method also includes selecting a branch metric function at a certain time index and applying the selected function to the signal samples to determine the metric values.

Claim Rejections - 35 USC § 103

The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 3-6, 9-10, 19 and 13-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kavcic et al. (USPN 6438180).

As per claims 3-6, Kavcic substantially teaches (col. 3, lines 20-68) a noise statistics tracker circuit 34 uses the delayed samples and detector decisions to update the noise statistics, i.e., to update the noise covariance matrices. A metric computation update circuit 36 uses the updated statistics to calculate the branch metrics needed in the Viterbi-like algorithm. The algorithm does not require replacing current detectors. It simply adds two new blocks in the feedback loop to adaptively estimate the branch metrics used in the Viterbi-like detector 30. The

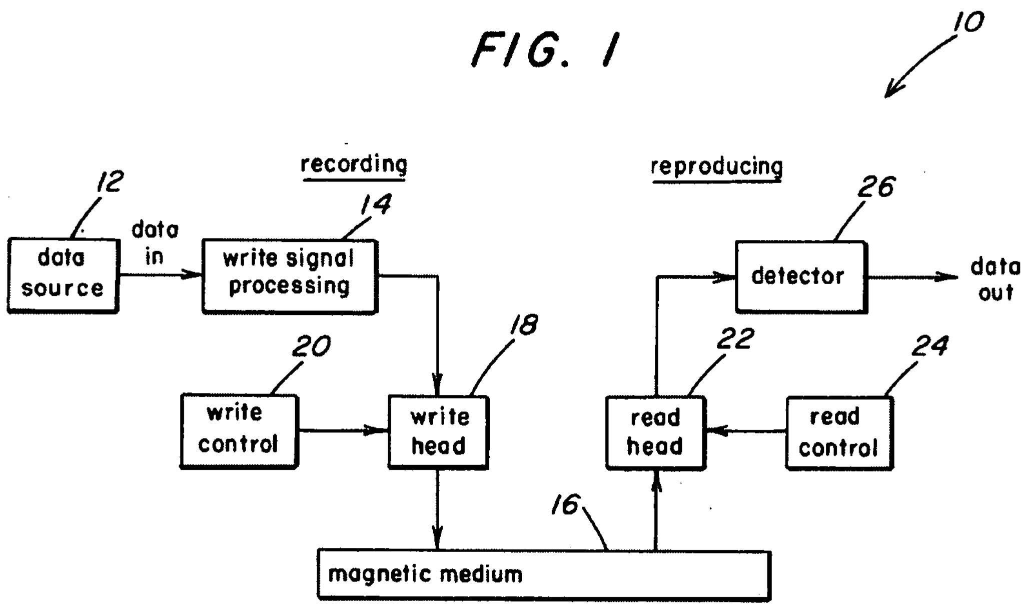
Viterbi-like detector 30 typically has a delay associated with it. Until the detector circuit 28 is initialized, signals of known values may be input and delayed signals are not output until the detector circuit 28 is initialized. In other types of detectors, the detector may be initialized by having the necessary values set.

Kavcic does not explicitly teach to calculate branch metric values using the various functions as stated in the present application.

However, Kavcic does teach (cols. 4-10) some functions to calculate branch metric values. Kavcic teaches (col. 7) that in the derivations of the branch metrics no assumptions were made on the exact Viterbi-type architecture, that is, the metrics can be applied to any Viterbi-type algorithm such as PRML, FDTS/DF, RAM-RSE, or, MDFE. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to calculate branch metric values using the various functions within the teachings of Kavcic. This modification would have been obvious to one of ordinary skill in the art because one of ordinary skill in the art would have recognized that calculating branch metric values using the various functions would optimize the branch metric value calculations.

As per claims 9, 10 and 19, Kavcic substantially teaches (Figure 1) the detector to be part of the read channel and is post processor.

FIG. 1



As per claims 13-16, Kavcic substantially teaches (col. 3, lines 20-68) a noise statistics tracker circuit 34 uses the delayed samples and detector decisions to update the noise statistics, i.e., to update the noise covariance matrices. A metric computation update circuit 36 uses the updated statistics to calculate the branch metrics needed in the Viterbi-like algorithm. The algorithm does not require replacing current detectors. It simply adds two new blocks in the feedback loop to adaptively estimate the branch metrics used in the Viterbi-like detector 30. The Viterbi-like detector 30 typically has a delay associated with it. Until the detector circuit 28 is initialized, signals of known values may be input and delayed signals are not output until the detector circuit 28 is initialized. In other types of detectors, the detector may be initialized by having the necessary values set.

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However, Kavcic does teach (cols. 4-10) some functions to calculate branch metric values. Kavcic teaches (col. 7) that in the derivations of the branch metrics no assumptions were made on the exact Viterbi-type architecture, that is, the metrics can be applied to any Viterbi-type algorithm such as PRML, FDTS/DF, RAM-RSE, or, MDFE. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to calculate branch metric values using the various functions within the teachings of Kavcic. This modification would have been obvious to one of ordinary skill in the art because one of ordinary skill in the art would have recognized that calculating branch metric values using the various functions would optimize the branch metric value calculations.

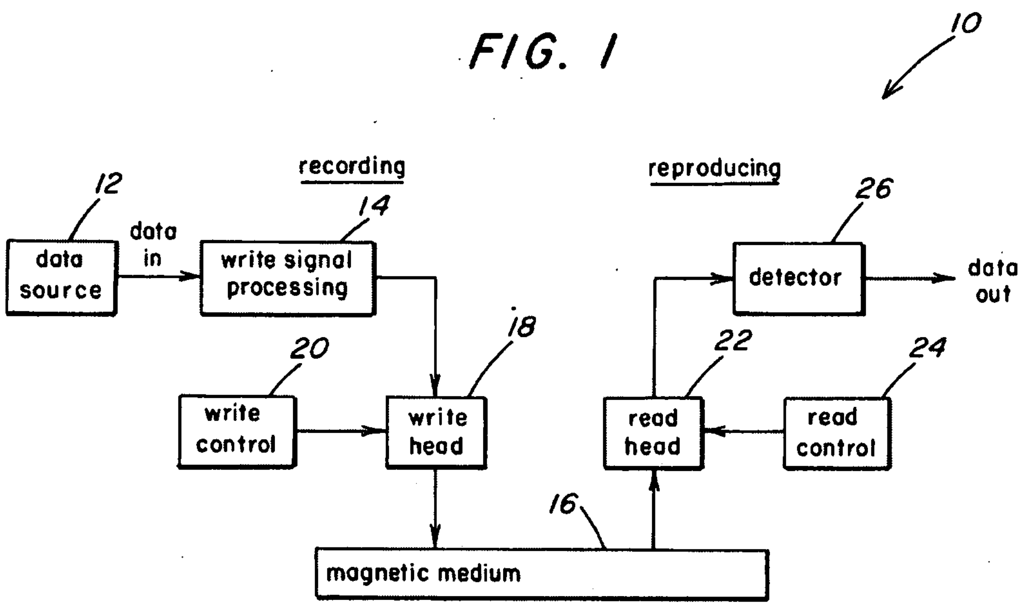
(10) Response to Argument

In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies are not recited in the rejected claim(s). Appellants' contend Kavcic (prior art of record) does not teach or suggest, "...transition jitter as a component of media noise and dependent upon positions of data transitions." Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

The Examiner would like to elaborate on the interpretation of limitation (b) in claim 1. For example, claim 1, step (b) recites, "...computing the branch metric values as a function of transition jitter statistics corresponding to the signal samples." In other words the branch metric calculations are based on transition jitter statistics corresponding to the signal samples.

Transition jitter statistics as argued by the Appellants is a *component of media noise and is dependent upon positions of data transitions*. The Examiner interprets these limitations as: "component of media noise" = part of noise which may affect the data during data transition (i.e., from 0 → 1 or 1 → 0) during reading. Media noise, by definition, is approximately proportional to the square root of the track width. Suppose a data bits [01001] are read from the recording medium and the actual data that was on the recording medium is [01011]. This is an example of the effects of transition jitter based on media noise and data transitions.

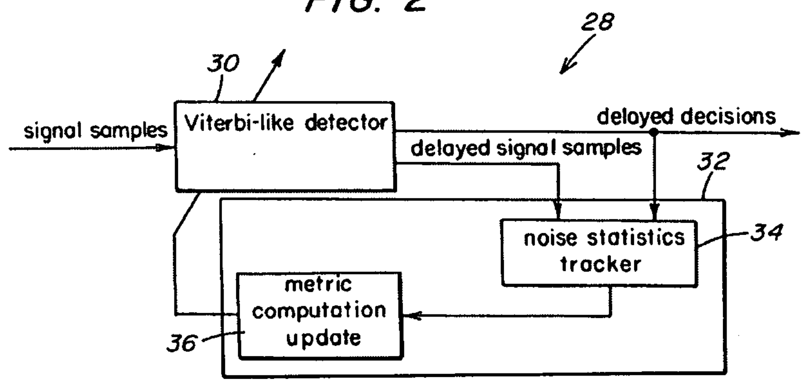
FIG. 1



Kavcic teaches (i.e., Figure 1, above) an environment wherein data is written with a write head (Figure 1, reference number 18) to a magnetic medium (Figure 1, reference number 16) and read via a read head (Figure 1, reference number 22). During reading data from the magnetic medium media noise may be present and cause errors. Therefore, the detector (Figure 1, reference number 26 and Figure 2, reference number 30, below) takes samples from the data read

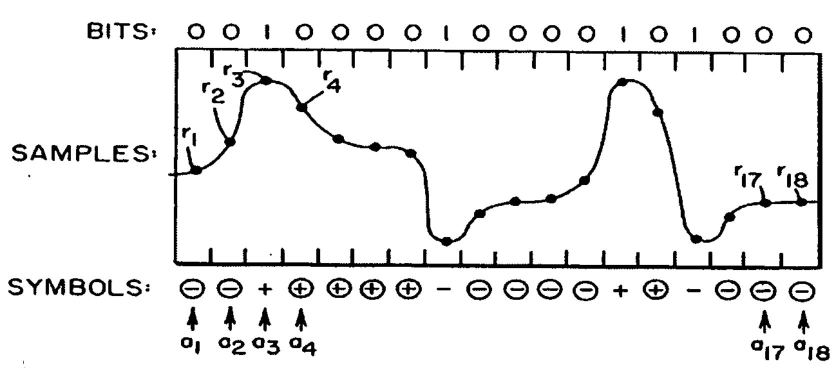
from the magnetic medium and computes branch metric values based on transition jitter statistics (Figure 2, reference number 34).

FIG. 2



Furthermore, Kavcic illustrates (i.e., Figure 3, below) a sample waveform wherein points r2, r3 and r4 correspond to bits 010. The Examiner would like to point out that the transition jittering always occurs during transition of a data signal. Therefore the sampling of the waveform clearly discloses sampling the transition jittering position of the waveform. See Figure 3 below:

FIG. 3



(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

10/4/07

Mujtaba Chaudry

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